Partition Kayles

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Henry Dudeney's Kayles is part of the foundation of combinatorial game theory: in a row of bowling pins, either one or two adjacent pins can be removed in each turn. What happens when the game is played on integer partitions? More specifically, the rim of a partition is the southeast boundary of the Ferrers diagram representation. In a turn of Partition Kayles, a player removes one or two adjacent cells from the rim such that the remaining figure is a valid integer partition (i.e., Ferrers diagram rows nonincreasing). Removing such 2-rim hooks (and longer variations) has applications in representation theory. Mixing the length of rim hooks that can be removed (here 1 and 2) makes interesting combinatorial games. Here, we explore both the normal and misère forms of Partition Kayles.